Non-CO_2 Greenhouse Gases: High-GWP Gases

Source/Sectors: Substitution of ODS/Solvent Uses

Technology: Alternative solvents (C.1.3.4)

Description of the Technology:
In electronics, metal, and some precision cleaning end uses, alternative organic solvents with lower GWPs are being introduced and integrated into the industry. These solvents including HFCs, HFEs, hydrocarbons, alcohols, volatile methyl siloxanes, brominated solvents, and non-ODS chlorinated solvents, can replace PFC/PFPEs, CFCs, and HCFCs. Since there is only a little use of HFC, PFC/PFPE, and HCFC in the metal and electronic cleaning end uses, these alternative solvents are primarily used for precision cleaning and carrier fluid applications instead of CFC-113 and methyl chloroform.

Recently, HFE solvents are especially being accepted as an effective alternative in solvent cleaning because of its low toxicity, non-flammability, zero ozone depleting potential, and low GWPs. It successfully replaced PFCs, HFCs, CFC-113, 1,1,1-trichloroethane, and HCFCs in precision cleaning (IEA, 2003).

Effectiveness: Good

Implementability: Variable; HFEs have a limited feasibility for HFC 4310mee solvents (IEA, 2003).

Reliability: HFEs are a viable alternative where the applicability is feasible (IEA, 2003).

Maturity: HFEs and the various azeotropic formulations based on HFEs are already in wide use in many developed countries.

Environmental Benefits: High-GWP gases emission reduction

Cost Effectiveness:

Technology	Lifetime (yrs)	MP (%)	RE (%)	TA (%)	Capital cost	Annual cost	Benefits
Alternative solvents[1]	10	30	85	5 - 100	$0.00	$1.29	$0.00

Note: MP: market penetration; RE: reduction efficiency; TA: technical applicability; costs are in year 2000 US$/$MT_{CO2\text{-}Eq.}$
1: USEPA (2001), IEA (2003), & USEPA (2004)

Industry Acceptance Level: HFE solvents are gaining acceptance in the US industry due to their availability, safety, and effectiveness (USEPA, 2004). This option is estimated to grow its market penetration in the United States to 60% by 2020. This means all PFC solvent emissions and more than half of the HFC solvent emissions (USEPA, 2006b).

Limitations: Technical applicability limitation exists in some industries, which use specific azeotropes or HFCs blends to replace with HFEs. There is no explicit study data for PFCs emissions from solvent sectors, hence, lack of information on HFE applicability to PFC (IEA, 2003).

Sources of Information:

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